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# Benevolent Planners, Malevolent Dictators and Democratic Voters\*

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## Abstract

We study the size of government and of GDP, under autocratic and democratic rule, respectively. It turns out that first, both democratic and authoritarian rulers apply the Samuelson (1954) criterion when deciding on productive public goods. Second, the labor supply elasticity and the skewness of the ability distribution determine whether democracy or autocracy will lead to the highest output. Third, when the ability distribution is sufficiently skewed, the democratic majority will behave like a rational autocrat, who chooses the tax rate that maximizes tax revenue. Fourth, population ageing in Western societies may lead to the policy preferred by a rational autocrat.

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## 1. Introduction

While the ethical and moral advantage of democracy over autocratic rule is undisputed, there seems to be less agreement as to whether democracy is also economically advantageous.

Some authors have argued that democratic voting markets work as well as economic markets, and that democracy can be expected to sustain efficient economic outcomes.<sup>1</sup> Others have argued that both democratic majorities and autocrats have an interest in setting tax rates so as to expropriate the greatest amount of resources possible from the rest of society. Unless it is supplemented with constitutional constraints on the exercise of majority power, democracy will therefore produce outcomes mimicking those of the revenue-maximizing Leviathan.<sup>2</sup>

In a number of publications, Mancur Olson has – independently, and jointly with Martin McGuire – initiated a systematic analysis of how democratic and authoritarian governments determine tax rates and spending on productive public goods.<sup>3</sup> Olson and McGuire conclude that democracy will have an economic advantage over rent-maximizing autocracy; income taxes will be lower, there will be more spending on productive public goods, and the gross domestic product and output per worker will be higher. Since a democratic majority earns a significant share of market income in society, it will have an incentive to pay for productive public goods, and to keep tax distortions within tolerable limits. By contrast, since an autocrat only cares about market income insofar as it affects the tax base, he will push the tax rate to the revenue-maximizing level.

Niskanen (2003) formulates a related analysis of the effects of form of government on fiscal choices and economic efficiency. He concludes that for plausible parameter values, a democratic government will spend about 70 percent more on productive public goods than an autocratic government, and levy an average tax rate that is about 20 percentage points lower

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<sup>1</sup> See e.g. Wittman (1989).

<sup>2</sup> See Brennan and Buchanan (1980).

<sup>3</sup> See Olson (1991, 1993, 2000) and McGuire and Olson (1996).

which, in combination, will give rise to an output per worker that is about 50 percent higher (Niskanen, 2003, p. 108).

Here, we derive new theoretical results on the effects of form of government on the design of fiscal policy. Following McGuire and Olson (1996) and Niskanen (2003), we study the impact of type of government on public spending that enhances the productivity of workers, as well as on the extent of income redistribution accomplished through a system of linear income taxation.<sup>4</sup> However, unlike McGuire and Olson, and Niskanen, we rely on a model that is derived from microeconomic principles. We follow the literature on optimal income taxation in specifying a general equilibrium model of a pure labor economy with heterogeneous workers, to which we add a simple public goods technology. This allows us to analyze how “deep” parameters reflecting preferences, technology and ability distributions shape the incentives of democratic and authoritarian governments, respectively.

Our main findings can be summarized as follows. First, irrespective of the form of government, spending on productive public goods will be such that the sum of the marginal productivity increments for all workers equals the direct marginal resource cost of providing the good. Thus, it will be in the best interest of both a (median voter) democracy and a rational dictator to honor the Samuelson (1954) criterion for the optimal provision of public goods. While Samuelson derived this criterion for a first-best environment, we show that both a democracy and a dictator will apply the criterion also in a second-best world of distortive taxation. This conclusion, which differs sharply from those of McGuire and Olson (1996) and Niskanen (2003), can be traced to the fact that both democratic and authoritarian rulers have incentives to counter tax distortions by investing resources in goods that increase the productivity of workers.

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<sup>4</sup> Like McGuire and Olson (1996) and Niskanen (2003) we confine ourselves to studying a static problem, abstracting from capital investments and problems of time consistency.

Second, we show that the uncompensated elasticity of labor supply with respect to the net-of-tax wage is decisive in determining whether democracy or autocracy will lead to the highest output. When labor supply is sufficiently inelastic, autocratic governments will in fact achieve higher output than democratic governments. Intuitively, when the uncompensated labor supply elasticity is close to zero, a rent-maximizing dictator can raise income taxes, and pocket the proceeds (after having paid for spending on public goods), at a modest cost in terms of foregone work hours among his citizens. In a democracy, the part of tax revenue that is not spent on public goods is instead returned to taxpayers as transfers, which will create income effects that tend to reduce labor supply along both the intensive and extensive labor supply margins.

Third, we characterize under what circumstances democracy mimics the outcome under Leviathan dictatorship, as predicted by e.g. Brennan and Buchanan (1980). In line with the median voter theory of income redistribution of Meltzer and Richard (1981), our model predicts that democracy will result in more redistributive taxation and a larger size of government, the larger the difference between median and average ability. When the ability distribution is sufficiently skewed, the median voter will be an agent who lives on transfers and does not participate in the labor force. In such a society, the democratic majority will behave like a rational autocrat, who chooses the tax rate that maximizes tax revenue, and who does not bother about deadweight loss.

While this paper is inspired by some recent work on the fiscal choices of autocratic and democratic governments, it is also related to two other, recent strands of literature. The literature on political economy has developed new, refined models of voter behavior, interest groups and representative democracy.<sup>5</sup> We abstract from such complications, and rely on a simpler model of democracy, the median voter model. While we acknowledge that this model

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<sup>5</sup> For recent overviews, see Besley and Case (2003) and Persson and Tabellini (2000).

has its limitations, we still think it offers a useful starting point for an analysis that attempts to clarify the first-order differences between autocratic and democratic rule.

Our analysis also relates to a large public economics literature on the criteria for the optimal supply of public goods. Following Pigou (1947), many authors have suggested that the simple Samuelson criterion does not apply in environments where policymakers have distributional objectives and have to rely on distortive taxation to finance spending on public goods. More recently, it has been shown that there are special cases, where the classic Samuelson criterion is the correct optimality rule for a benevolent social planner who cares about distribution and wants to minimize the labor supply distortions from income taxation.<sup>6</sup> Our analysis contributes to this literature. While previous studies have examined the applicability of the Samuelson criterion from a normative point of view, we study it from the point of view of positive political economy. We thus clarify under what circumstances democratic and authoritarian rulers will find it in their own best interest to apply the Samuelson criterion when they invest in productive public goods.

The next section introduces some basic assumptions. Section 3 contains general characterizations of the fiscal incentives facing benevolent planners, and autocratic and democratic rulers. Section 4 provides some illustrative calculations. In the concluding section we apply our theoretical considerations to an analysis of the potential effects of population ageing on the fiscal choices of developed democracies over the coming decades.

## **2. Technology, productive public services and the tools of redistribution**

### *2.1 Preferences and technology*

We consider an economy where there is a continuum of agents, characterized by a distribution of innate abilities, defined over the interval  $[\underline{a}, \bar{a}]$ , where  $\underline{a}$  and  $\bar{a}$  are the lower and upper

support of the ability distribution. We normalize the total population mass to unity, and let  $F(a)$  denote the cumulative distribution function. Each agent  $i$  has a time endowment of one unit, and derives utility from consuming a consumption good in quantity  $c_i$ , and disutility from time spent working in the labor market,  $n_i$ :

$$u_i = u(c_i, n_i). \quad (1)$$

The utility function is twice continuously differentiable, quasi-concave, and with  $u_c > 0$  and  $u_n < 0$ . Agents supply labor in a perfect labor market and obtain an hourly wage rate  $w_i$ . We assume that all agents are perfect substitutes in the production of the consumption good, and that there is a linear production technology; under these assumptions, wages and wage relativities will not depend on labor supply.

We assume that the government spends money on some public service,  $g$ , which augments the productivity of the private sector. Like McGuire and Olson (1996) and Niskanen (2003), we disregard all complications that would follow from introducing productive public capital, and we treat  $g$  as a flow variable created by tax-financed purchases of the private consumption good.<sup>7</sup> We assume that this service is not subject to congestion effects, so that an extra dollar spent on  $g$  increases the productivity of all agents. For every agent  $i$ , productivity thus depends on public spending and on innate ability:

$$w_i = w(g, a_i) = A(g)a_i. \quad (2)$$

We assume that the  $A(g)$  function satisfies

$$A(0) = 0 \quad (3a)$$

$$\partial A / \partial g > 0 \quad (3b)$$

$$\partial^2 A / \partial g^2 < 0. \quad (3c)$$

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<sup>6</sup> See e.g. Atkinson and Stern (1974), Hylland and Zeckhauser (1979), Christiansen (1981) and Boadway and Keen (1993). For a recent review, see Kaplow (2004).

<sup>7</sup> See also Barro (1990).

These technical assumptions ensure that the government always invests some resources in the public good (equation (3a)), and that the government solves a well-defined concave optimization problem (equations (3b)-(3c)). The strong and unproven assumption – on which some of our results will depend – underlying (2) is that public spending gives a proportional boost to the labor productivity of low- and high-ability agents. It is not difficult to think of alternative assumptions. Public spending on higher education might best be regarded as a category that contributes mainly to increasing the productivity of high-ability agents, while spending on public libraries or public transportation might matter relatively more for the labor market productivity of low-ability agents. In any case, we view (2) as a useful benchmark.

## 2.2 Fiscal redistribution

Tax revenue is used for three purposes: to finance redistribution, to finance public spending on productive public goods,  $g$ , and to raise income for the dictator (under autocracy). Under each form of government we assume that the government uses a linear income tax system with two parameters: a constant marginal tax rate  $t$ , and a lump-sum social transfer  $k$ . The individual's budget constraint can thus be written as

$$c_i = n_i w_i (1 - t) + k, \quad (4)$$

where  $t \in [0, 1]$  and  $k \geq 0$ .<sup>8</sup> For individuals who do not work, consumption equals the social transfer. With positive  $t$  and  $k$ , the tax system is progressive in the sense that the average tax rate increases with pre-tax labor income.

Under democracy, equation (4) applies to all agents in the economy, *including* the median voter, who sets  $t$ ,  $k$  and  $g$  so as to maximize her indirect utility (subject to the government's budget constraint, discussed below). Under autocracy, equation (4) applies to

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<sup>8</sup> While there is no *a priori* restriction on the sign of  $k$ , a negative  $k$  cannot generally be implemented on low-income earners. If we assume that  $\underline{a}$  (the lower limit of innate ability) can be equal to zero, we thus have implicitly assumed that  $k \geq 0$ .

all agents *except* the autocrat, who sets  $t$ ,  $k$  and  $g$ , and expropriates the difference between gross tax revenue and spending on public goods. The median voter in a democracy may well prefer a strictly positive  $k$ . An autocrat would prefer a positive  $k$  only if it would produce an increase in tax revenue that more than compensates for the budgetary cost of paying a social transfer. If leisure is a normal good, however, this is not possible. Thus, under autocracy, the optimal  $k$  will in fact always be equal to zero.

In our view, this way of modeling redistribution captures a key difference between democratic and autocratic rule. Our median voter has to obey the tax rules of her own design, and income is the only legitimate source of redistribution. As a consequence, the median voter cannot target income redistribution perfectly, which will result in a leakage of tax revenue to agents with lower incomes than that of the median voter. Our dictator, by contrast, exempts himself from taxation and confiscates all tax revenue; thus, the autocrat can target income redistribution perfectly. This characterization of income redistribution under democracy and autocracy is obviously an approximation. While democracies have constitutions that rule out discriminatory tax policy, it is not so difficult to find examples where various tax exemptions are introduced for the purpose of benefiting strategic electoral groups.

### 2.3 Labor supply: discrete and continuous incentive margins

Agents maximize the utility function (1), subject to  $n \in [0,1]$  and the budget constraint (4).

The first-order condition becomes:

$$u_c(w_i(1-t)n_i + k, n_i)w_i(1-t) + u_n(w_i(1-t)n_i + k, n_i) = 0. \quad (5)$$

Equation (5) gives us the labor supply function

$$n_i = n(w_i(1-t), k). \quad (6)$$

We make the standard assumption that both leisure and consumption are normal goods; this implies, e.g., that the sign of  $\partial n_i / \partial w_i(1-t)$  is indeterminate, while  $\partial n_i / \partial k < 0$ .



The continuous labor supply function (6) applies to the agents who choose to participate in the labor force. Low-productivity agents may end up in a corner solution, where they supply zero hours of work and live off social transfers. As will be shown below, it is when low-productive agents who live off transfers form the decisive group that fiscal choices in a democracy may mimic choices under dictatorship. To identify the group of low-productive agents, we set  $n_i = 0$  in (5), and solve for the wage  $w^*$  that gives a zero net utility gain from a marginal increase in labor supply:

$$w^* = \frac{-1}{1-t} \cdot \frac{u_n(k,0)}{u_c(k,0)} > 0. \quad (7)$$

Combining (7) and (2), we can solve for the ability level  $a^*$  for an individual who is exactly indifferent between participation and nonparticipation in the labor market:

$$a^* = \frac{-1}{(1-t)A(g)} \cdot \frac{u_n(k,0)}{u_c(k,0)} \equiv a^*(k,t,g). \quad (8)$$

Low-ability agents with  $a_i \leq a^*$  live off social transfers and supply zero work hours, while agents with  $a_i > a^*$  supply labor according to (6). It is straightforward to show that

$$(i) \frac{\partial a^*}{\partial g} < 0 \quad (ii) \frac{\partial a^*}{\partial t} > 0 \quad (iii) \frac{\partial a^*}{\partial k} > 0. \quad (9)$$

More spending on productive public goods tends to increase labor force participation, while higher income taxes and more generous social transfers work in the other direction.

#### *2.4 The role of income effects under autocracy and democracy*

McGuire and Olson (1996) and Niskanen (2003) argue that democratic governments generate more output and higher labor productivity than rational autocrats. The results shown below suggest that for certain consumer preferences, output and productivity will in fact be higher under autocracy. An important reason for these conflicting findings is that the reduced-form models of McGuire and Olson (1996) and Niskanen (2003) fail to distinguish between the

counteracting income and substitution effects on labor supply that are created via redistributive taxation and social transfers.

Consider two governments, one authoritarian and one democratic, that have decided to impose the same tax rate and the same spending on the public good. Under authoritarian rule, the dictator sets  $k$  equal to zero and confiscates all tax revenue that remains after financing the public good; under democratic rule the remaining tax revenue is distributed as a lump-sum social transfer. But this social transfer will tend to reduce labor supply under democracy along both the intensive (“how many hours should I work?”) and extensive (“should I work at all?”) incentive margins.<sup>9</sup> The impact of democracy on continuous labor supply follows from (6) and our assumption that leisure is a normal good. The impact of democracy on the discrete labor supply decision follows from (7) and (8). Under standard assumptions, if  $k \rightarrow 0$  the ratio  $-u_n(k, 0)/u_c(k, 0)$ , and hence  $a^*$ , will tend to zero; if  $k$  takes on some positive value, so will  $-u_n(k, 0)/u_c(k, 0)$ , and hence  $a^*$ . Thus, in an economy without social transfers every agent participates in the workforce, while in an economy with social transfers low-wage workers supply no labor at all. Labor force participation is therefore bound to be higher under autocracy than democracy.

### 3. Fiscal policy

#### 3.1 A benevolent social planner

As a benchmark, we characterize the allocation that would be chosen by a utilitarian government that determines  $t$ ,  $k$ , and  $g$  so as to maximize the sum of individual utilities.

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<sup>9</sup> Here, the argument that labor supply will be lower under democracy is obviously partial, since it does not account for the fact that optimizing dictators and democratic governments set different tax rates, or spend different amounts on public goods. As we discuss below, autocrats will find it optimal to impose higher tax rates than democracies, and these added tax distortions must be accounted for when computing the overall production differential between autocracy and democracy.

Letting  $v(w_i(1-t), k)$  denote the indirect utility function of individual  $i$ , the government solves the problem

$$\max_{k, t, g} \int_{\underline{a}}^{\bar{a}} v(w_i(1-t), k) dF(a), \quad (10)$$

subject to (2), and the budget constraint

$$tY = k + g, \quad (11)$$

where

$$Y = \int_{a^*(k, t, g)}^{\bar{a}} w_i n_i(w_i(1-t), k) dF(a). \quad (12)$$

Our definition of GDP in (12) will allow for fiscal policy to have an effect on both the continuous and the discrete labor supply decisions, i.e., the derivative  $\partial Y / \partial t$  accounts for the impact of  $t$  on both the integrand and the limit level of integration.

Differentiating the Lagrangean for this optimization problem with respect to  $k$ ,  $t$  and  $g$  gives us the first-order conditions

$$\int_{\underline{a}}^{\bar{a}} \lambda_i dF(a) = \mu \left\{ 1 - t \frac{\partial Y}{\partial k} \right\} \quad (13)$$

$$\int_{\underline{a}}^{\bar{a}} \lambda_i n_i A(g) a_i dF(a) = \mu \left\{ t \frac{\partial Y}{\partial t} + Y \right\} \quad (14)$$

$$\int_{\underline{a}}^{\bar{a}} \lambda_i n_i A'(g) a_i (1-t) dF(a) = \mu \left\{ 1 - t \frac{\partial Y}{\partial g} \right\}, \quad (15)$$

where, using Roy's identity,  $\lambda_i$  is individual  $i$ 's marginal utility of income,  $\mu$  is the marginal utility of income in the public sector, and  $n_i = 0$  for all  $a_i \leq a^*(g, t, k)$ . Conditions (13) and (14) are identical to those generated by the standard problem of optimal linear income

taxation.<sup>10</sup> For later reference, it is helpful to note that (14) implies that a benevolent social planner will always choose an optimal tax rate that is on the upward-sloping segment of the Laffer curve; since  $\mu > 0$ , and since the integral on the left-hand side takes a positive value, it follows that the terms in curled brackets must take a positive value.

The left-hand side of (15) is society's marginal benefit from productive public goods, and the right-hand side is society's marginal cost. The marginal benefit consists of the weighted average of agents' productivity increase from spending on public goods, where the weighting factor is the agent's marginal utility of income,  $\lambda_i$ . Since a benevolent planner cares about agents' welfare, the productivity increase is measured net of tax, i.e., marginal take-home pay is what matters. Society's marginal cost is the product of the marginal utility of income in the public sector,  $\mu$ , and the direct resource cost, which consists of the cost (of unity) of purchasing one extra unit of productive public goods, minus the induced increase in tax revenue (via a larger tax base) that is generated by an extra unit of the public good.

For further interpretation of (15), it is useful to first consider the case where a benevolent planner has access to individualized lump-sum taxes. In this case  $t = 0$ , and  $\lambda_i = \mu$  for all  $i$ . For such a distortion-free economy, (15) reduces to

$$A'(g) \int_{\underline{a}}^{\bar{a}} n_i^{FB} a_i dF(a) = 1, \quad (16)$$

where  $n_i^{FB}$  is labor supply in a first-best equilibrium, without distortionary taxation. Equation (16) is the classic optimality condition of Samuelson (1954), modified here for the case of a productive public good. Spending on productive public goods should proceed to the point where the marginal increase in aggregate production on the left-hand side equals the direct marginal resource cost. There are no distributional weights in the summation on the left-hand

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<sup>10</sup> See e.g. Dixit and Sandmo (1977) for further discussion and interpretation. See also Sandmo (1998), who examines optimal provision of non-productive public goods in a linear optimal taxation model.

side, i.e., the  $\lambda$ -terms which appear in (15) are missing. Marginal social benefits are linked to the increase in aggregate production, and not to how this increase is distributed among workers. Thus, in an economy with individualized lump-sum taxes, the problem of allocational efficiency is separated from the problem of income redistribution.

We now show that the Samuelson condition will in fact apply in the distorted economy as well, where equations (13)-(15) characterize optimal choice. To see this, we rewrite (15) along the lines of e.g. Sandmo (1998). We define the average of individuals' marginal utilities of income as

$$\bar{\lambda} = \int_{\underline{a}}^{\bar{a}} \lambda_i dF(a) . \quad (17)$$

Using (2), (17) and the fact that

$$\text{cov}(\lambda_i, w_i n_i) = \int_{\underline{a}}^{\bar{a}} \lambda_i w_i n_i dF(a) - \int_{\underline{a}}^{\bar{a}} \lambda_i dF(a) \int_{\underline{a}}^{\bar{a}} w_i n_i dF(a) , \quad (18)$$

we can rewrite (15) as:

$$(1-t)(1+\delta) \left\{ A'(g) \int_{\underline{a}}^{\bar{a}} n_i a_i dF(a) \right\} = \frac{\mu}{\lambda} \left\{ 1 - t \frac{\partial Y}{\partial g} \right\} , \quad (19)$$

where  $\delta = \text{cov}(\lambda_i, w_i n_i) / \lambda Y$ . Compared to the first-best optimality condition in (16), there are four correction factors in (19). On the left-hand side, the aggregate productivity increase – which coincides with the left-hand side of (16) – is first transformed into private, net-of-tax units by multiplying by the factor  $1-t$ , and then by the factor  $1+\delta$ , which is a normalized measure of the distributional characteristics of the public good. Under the standard assumption that agents' labor incomes increase with the wage, while the marginal utility of income decreases,  $\delta$  will be negative. Thus, a utilitarian planner uses a weighting factor  $1+\delta$  that lowers the benefits from spending on productive public goods. The right-hand side of (19) contains the third and fourth correction terms. The resource cost is adjusted for the

increase in tax revenue that follows from the increase in the tax base generated by an extra unit of the public good, the term  $t \cdot \partial Y / \partial g$ . The last correction term is  $\mu/\lambda$ , which is the ratio of marginal utilities of income in the public and private sectors.

It turns out that once we introduce the financing side into the picture, all these correction effects cancel out. Since both the benefits from the public good and the costs of financing it via income taxation are proportional to workers' incomes, a self-financed package of taxes and spending on public goods can have no effect on the utility distribution. Moreover, in the optimum solution, marginal spending on the productive public good will exactly balance the disincentive effects from increasing the marginal tax rate. To see why, we rewrite the first-order condition with respect to  $t$ , equation (14), as

$$1 + \delta = \frac{\mu}{\lambda} \left\{ 1 + \frac{t}{Y} \frac{\partial Y}{\partial t} \right\}. \quad (20)$$

Combining (19) and (20), we obtain

$$A'(g) \int_{\underline{a}}^{\bar{a}} n_i a_i dF(a) = \frac{\left\{ 1 - t \frac{\partial Y}{\partial g} \right\} (1-t)^{-1}}{1 + \frac{t}{Y} \frac{\partial Y}{\partial t}}. \quad (21)$$

When we consider the distributional effects from the financing side, the distributional weights disappear from the formula altogether for the optimal provision of public goods. Compared to the first-best condition (16), equation (21) still contains additional correction terms, thereby capturing the tax-base effects of simultaneously increasing spending on productive public goods and raising the marginal tax rate. It is a tedious though straightforward exercise, relegated to the Appendix, to show that these tax-base effects cancel out, i.e., we have that

$$\frac{\left\{ 1 - t \frac{\partial Y}{\partial g} \right\} (1-t)^{-1}}{1 + \frac{t}{Y} \frac{\partial Y}{\partial t}} = 1. \quad (22)$$

Combining (21) and (22), we obtain

$$A'(g) \int_{\underline{a}}^{\bar{a}} n_i^{SB} a_i dF(a) = 1, \quad (23)$$

i.e., the Samuelson condition applies not only to the first-best setting, but also to the utilitarian optimum in an economy with distortive taxation. It should be noted, however, that (23) will not generate the same level of spending on productive public goods as (16). In (23) spending on productive public goods is conditioned on the labor supply,  $n_i^{SB}$ , that emerges in a second-best environment, where the social planner is confined to using distortionary taxation when redistributing from rich to poor. In (16), spending on public goods is conditioned on the labor supply that arises in a first-best equilibrium, with individualized lump-sum taxes.

In this context, it is helpful to note that (23) can be rewritten as

$$\frac{g}{Y^{SB}} = \alpha(g), \quad (24)$$

where  $\alpha(g) = gA'(g) / A(g)$ , and  $Y^{SB} = A(g) \int_{\underline{a}}^{\bar{a}} a_i n_i^{SB} dF(a)$ . This expression says that in a utilitarian second-best optimum, the size of the public sector, as a fraction of GDP, is equal to the elasticity of the  $A(g)$  function with respect to  $g$ . In the special case where the  $A(g)$  function has a constant elasticity, such that  $A(g) = g^\alpha$ , the optimal share of spending on public goods is always equal to  $\alpha$ .

According to the “new view” of optimal public goods provision, there are a number of important special cases where the Samuelson criterion is the correct normative criteria for public goods provision; see Kaplow (2004) for an overview of the literature. Kaplow (1996) discusses special cases in which both the benefits from spending on public goods and the required tax adjustments are proportional to income, and in which the Samuelson criterion provides all the necessary guidance for a benevolent social planner. Our analysis of productive public goods, financed by a system of linear income taxation, produces the same result.

### 3.2 Autocracy

We next turn to the fiscal choices of governments that do not maximize a social welfare function, namely autocracies and democratic majorities. We start by considering the prototype selfish autocrat who maximizes the amount of resources that he can expropriate from the private sector, after having incurred the direct resource cost for productive public goods.

Formally, the autocrat solves the following problem:

$$\underset{t,g}{\text{Max}} \quad t \int_{\underline{a}}^{\bar{a}} w_i n(w_i(1-t), 0) dF(a) - g, \quad (25)$$

subject to (2). In specifying (25) we have exploited the fact that a self-interested autocrat always sets  $k = 0$ , which implies that  $a^* = \underline{a}$ . We can write (25) in a more compact form:

$$\underset{t,g}{\text{Max}} \quad tY - g. \quad (26)$$

The first-order conditions are:

$$t \frac{\partial Y}{\partial t} + Y = 0 \quad (27)$$

$$t \frac{\partial Y}{\partial g} - 1 = 0. \quad (28)$$

Equation (27) shows that a rational autocrat chooses the point on the Laffer curve that maximizes tax revenue, and that he does not care about deadweight loss *per se*. Equation (28) shows that a rational autocrat invests in the public good to the point where his marginal revenue gain (tax rate times the induced increase in the tax base) equals the marginal resource cost.

To proceed, it is useful to note that

$$\frac{\partial Y}{\partial t} = -\frac{1}{1-t} \int_{\underline{a}}^{\bar{a}} \eta_i A(g) n_i a_i dF(a), \quad (29)$$



$$\frac{\partial Y}{\partial g} = A'(g) \int_{\underline{a}}^{\bar{a}} n_i a_i dF(a) \left\{ 1 + \int_{\underline{a}}^{\bar{a}} \eta_i n_i a_i dF(a) \middle/ \int_{\underline{a}}^{\bar{a}} n_i a_i dF(a) \right\}, \quad (30)$$

where  $\eta_i = w_i(1-t)n'_i/n_i$  is the uncompensated elasticity of labor supply with respect to the net-of-tax wage.

Using (29) and (30), we next rewrite the first-order conditions as

$$\frac{1-t}{t} = \int_{\underline{a}}^{\bar{a}} \eta_i a_i n_i dF(a) \middle/ \int_{\underline{a}}^{\bar{a}} a_i n_i dF(a) \quad (27')$$

$$tA'(g) \int_{\underline{a}}^{\bar{a}} n_i a_i dF(a) \left\{ 1 + \int_{\underline{a}}^{\bar{a}} \eta_i n_i a_i dF(a) \middle/ \int_{\underline{a}}^{\bar{a}} n_i a_i dF(a) \right\} = 1. \quad (28')$$

Equation (27') shows that the uncompensated labor supply elasticity will play a decisive role in shaping a rational autocrat's choice of tax rate. In the limiting case where  $\eta_i \rightarrow 0$  for all  $i$ , it follows that  $t \rightarrow 1$ . Thus, with a vertical labor supply curve, an autocrat maximizes his tax theft when the tax rate is set at 100 percent. Such a confiscatory tax rate will create sizeable deadweight loss. This efficiency loss will depend on the magnitude of the *compensated* labor supply elasticity which, however, is of no concern to the autocrat.

Combining (27') and (28'), we obtain

$$A'(g) \int_{\underline{a}}^{\bar{a}} n_i^A a_i dF(a) = 1. \quad (31)$$

Thus, a rational autocrat, whose sole objective is to maximize his tax theft, will also rely on the Samuelson criterion when spending resources on productive public goods. A rational autocrat realizes that spending on productive public goods counteracts the disincentive effects from income taxation. Compared to the decision rule of the benevolent social planner, shown in (23), the only difference is that the decision rule in (31) is conditioned on the labor supply that arises under autocracy. As we will show below, it is easy to come up with examples (built around the case where the uncompensated labor supply elasticity is small), where labor supply

will be higher under autocracy than with a utilitarian planner. In these examples, it follows readily, from comparing equations (23) and (31), that a malevolent dictator spends more on productive public goods than a utilitarian planner.

We may now rewrite (31) in terms of the elasticity of the  $A(g)$  function as

$$\frac{g}{Y^A} = \alpha(g). \quad (32)$$

Just like a benevolent utilitarian planner, the malevolent autocrat will set the relative size of the public sector equal to the elasticity of the  $A(g)$  function. For the special case of  $A(g) = g^\alpha$ , the autocrat's spending on  $g$  as a percentage of GDP is simply equal to  $\alpha$ .

### 3.3 Democracy

Who is in charge of redistributive tax policy and public spending in a democracy? McGuire and Olson (1996) assume that a ruling majority determines tax policy, and that the ruling majority earns a (possibly large share) of overall market income. Here, we proceed along the lines of Meltzer and Richard (1981), and of Niskanen (2003), and assume that the individual with median labor market productivity is in charge of determining both the tax rate and spending on productive public goods. Specifically, we assume that the tax and spending decisions of the government are determined by the voter with median ability,  $a_m$ ; this will also be the voter with the median wage,  $w_m$ .<sup>11</sup>

Our median voter maximizes her indirect utility function  $v(w_m(1-t), k)$ , subject to (2) and the government's budget constraint in (11). Formally, the optimization problem is

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<sup>11</sup> Do voters in our model have the preferences that are required for the median voter theorem to hold? Even though our decision problem contains three choice variables,  $k$ ,  $t$ , and  $g$ , the budget constraint of the government can be used to reduce it to a two-dimensional problem in  $t$  and  $g$ . Furthermore, our assumption that both the benefits from the public good and the costs of financing it via income taxation are proportional to workers' incomes implies that all workers, irrespective of ability  $a_i$ , will agree on the optimal  $g$ . Thus, there will only be disagreement on the choice of  $t$ . Provided that preferences satisfy the standard single-crossing property, voters will have single-peaked preferences in the choice of  $t$ . Every voter with ability below (above) the median ability would thus prefer a higher (lower) tax rate.

$$\max_{k,t,g} v(w_m(1-t), k) + \mu(tY - k - g), \quad (33)$$

with first-order conditions

$$\lambda_m = \mu \left\{ 1 - t \frac{\partial Y}{\partial k} \right\} \quad (34)$$

$$\lambda_m n_m A(g) a_m = \mu \left\{ t \frac{\partial Y}{\partial t} + Y \right\} \quad (35)$$

$$\lambda_m n_m A'(g) a_m (1-t) = \mu \left\{ 1 - t \frac{\partial Y}{\partial g} \right\}, \quad (36)$$

where, using Roy's identity,  $\lambda_m$  is the marginal utility of income of the median voter. Several observations are in order.

First, the structure of the first-order conditions under democracy is identical to the structure of the first-order conditions under a benevolent planner. Comparing equations (13)-(15) to equations (34)-(36), it may be noted that they look the same, except that the integrals showing the average marginal utility under a benevolent planner are replaced by the marginal utility of income of the median voter under democracy.

Second, combining (34), (35) and the budget constraint in (11), we can rewrite the first-order condition for the median voter's preferred tax rate as

$$Y + t \frac{\partial Y}{\partial t} - w_m n_m = 0. \quad (37)$$

Due to our normalized population function,  $Y$  is both total and average (labor) income. Thus, (37) replicates the well-known result of Meltzer and Richard (1981) that the choice of tax rate in a democracy depends on the difference between average and median income. Here, and in what follows, we always assume that the earnings distribution is skewed to the right, so that median income falls below average income. Under this assumption, it is only the responsiveness of labor supply that prevents the median voter from imposing a tax rate of 100 percent.

A direct implication of (37), which will be discussed in greater detail below, is that changes in the underlying ability distribution that increase the difference between average and median ability will raise the preferred tax rate, and lower output. When the ability distribution is sufficiently skewed, the median voter will in fact be an individual who lives off social transfers, and who does not participate in the labor force, i.e.  $n_m = 0$  in (37). A median voter who does not work will not bother about the deadweight loss from taxation, and he will therefore prefer the tax rate that maximizes tax revenue. Thus, in this special case, the median voter behaves like a rational autocrat, who wants to attain the maximum point on the Laffer curve.<sup>12</sup>

Third, it is easy to show that the median voter also prefers to spend resources on productive public goods in a way that honors the Samuelson condition. Dividing (36) by (35), and some re-arranging, gives us

$$A'(g) \int_{\underline{a}}^{\bar{a}} n_i a_i dF(a) = \frac{\left\{1 - t \frac{\partial Y}{\partial g}\right\} (1-t)^{-1}}{1 + \frac{t}{Y} \frac{\partial Y}{\partial t}}, \quad (38)$$

which is identical to equation (21), describing optimal spending on  $g$  in the case of a benevolent planner. Invoking the derivations shown in the Appendix, (38) reduces to

$$A'(g) \int_{\underline{a}}^{\bar{a}} n_i^D a_i dF(a) = 1, \quad (39)$$

where superscript  $D$  refers to the case of democracy. It is again useful to rewrite the first-order condition (39) to obtain the optimal value of  $g$  as a fraction of GDP:

$$\frac{g}{Y^D} = \alpha(g). \quad (40)$$

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<sup>12</sup> In spite of the formal similarity between the first-order conditions under autocracy and democracy when the median voter does not work, the optimal levels of taxes and public spending will differ. The first order conditions depend on the level of social transfers,  $k$ , which are set to zero under rational autocracy, and to some positive number under democracy. Thus, democratic decision-making generates income effects that are not present under rational autocracy.

#### 4. Some illustrations

McGuire and Olson (1996) and Niskanen (2003) argue that democracies are bound to pursue fiscal policies that generate higher output than rational dictatorships. It is easy to show that this conclusion need not hold. Let us introduce the following assumptions concerning technology and worker preferences:

$$A(g) = g^\alpha \quad (41)$$

$$u(c_i, n_i) = \ln c_i + b \ln(1 - n_i). \quad (42)$$

Equation (41) implies that the  $A(g)$  function has a constant elasticity with respect to  $g$ . From equations (24), (32) and (40), it then follows that the share of spending on public goods as a percentage of GDP will be  $\alpha$  under all three forms of government. Thus, to find out whether dictatorship leads to less or more spending on public goods, all we need to know is whether GDP will be higher or lower under dictatorship.

In fact, when workers have logarithmic preferences, as in equation (42), it is straightforward to show that GDP will always be highest under autocracy. Equation (42) implies that the labor supply function becomes:

$$n_i = \frac{w_i(1-t) - bk}{w_i(1-t)(1+b)} \quad \text{if } w_i > w^* \equiv bk/(1-t) \quad (43a)$$

$$n_i = 0 \quad \text{if } w_i \leq w^* \equiv bk/(1-t). \quad (43b)$$

Since a rational autocrat sets  $k$  to zero, it follows immediately that aggregate labor supply, and hence GDP, will be higher under dictatorship than with a median voter or a benevolent planner. The reason is that with  $k = 0$ , it follows from (43b) that every individual with ability greater than zero will work, irrespective of the income tax rate. Further, it follows from (43a) that everyone will supply  $1/(1+b)$  hours of work, irrespective of the going tax rate. Since, for this case, the uncompensated wage elasticity is zero, it follows from (27') that the rational autocrat will maximize his tax revenue by setting  $t$  arbitrarily close to unity.

Under democracy (or under a benevolent planner), the tax rate will be bounded away from unity, and  $k$  will be some positive number. For these reasons, fewer people will go to work in a democracy, and those who go to work will work shorter hours. Thus, with logarithmic preferences (42), GDP will be lower in democracy (or with a benevolent social planner), and there will also be less spending on productive public goods.

Although empirical studies for different countries suggest that the labor supply curve is close to vertical for some groups in the labor market, the most natural approach is to proceed under the assumption that the aggregate labor supply curve slopes upwards, i.e., the uncompensated labor supply curve is greater than zero. To examine this possibility, we have simulated our model, under the assumption that the utility function in (42) is replaced by the CES formulation:

$$u(c_i, n_i) = \frac{c_i^\rho}{\rho} + b \frac{(1 - n_i)^\rho}{\rho} \quad \text{if } 0 < \rho < 1 \quad (44a)$$

$$u(c_i, n_i) = \ln c_i + b \ln(1 - n_i) \quad \text{if } \rho = 0. \quad (44b)$$

Intuitively, the larger the value of  $\rho$ , the greater is the responsiveness of labor supply to changes in the net wage.

A second important parameter for the comparison across forms of government is the degree of skewness of the underlying distribution of abilities. Since our model of democracy builds on the median voter theory of income distribution of Meltzer and Richard (1981), a larger difference between mean and median ability will lead to a higher tax rate under democracy, and a larger disincentive to labor supply. In our simulations, we used a lognormal distribution

$$f(a) = \frac{1}{a\sigma\sqrt{2\pi}} \cdot e^{-(\ln a - \mu)^2 / 2\sigma^2}$$

to characterize the ability distribution. Here,  $\mu$  and  $\sigma$  are the mean and the standard deviation of the underlying normal distribution. In our simulations, we kept the average

ability  $E(a_i)$  constant and equal to unity; for different values of  $\sigma$ , we therefore adjusted  $\mu$  so that  $E(a) = e^{\mu + (\sigma^2)/2} = 1$ . Increasing  $\sigma$  in this fashion will increase the difference between mean and median ability.

(Figure 1 about here)

Figure 1 shows the combinations of the labor supply parameter  $\rho$  and the degree of (right-hand) skewness of the ability distribution for which rational autocracy leads to higher GDP than democracy. Points to the south-east of the solid curve represent parameter configurations where autocracy gives higher GDP, while the opposite holds for points to the north-west of the curve. Obviously, if the difference between average and median ability is not very large, autocracies will have a larger GDP than democracies only in those cases where the compensated labor supply elasticity is “almost” zero (i.e. when  $\rho$  is close to zero). However, when the difference between average and median income becomes sufficiently large, autocracies will have a larger GDP even if the labor supply curve is fairly elastic.

### 5. Ageing voters: the march towards Leviathan?

In the end, the vibrant economy of the United States out-competed the rigid resource allocation system of the Soviet Union. Whereas this undisputed fact is often interpreted as a manifest illustration of the economic superiority of democratic rule over dictatorship, our analysis suggests that the form of government is not necessarily the decisive factor.

Depending on the economic environment – the preferences of households and the distribution of abilities – democracy might produce either more or less output than a rational dictatorship. Unfortunately, the appealing notion that democratic rule is a necessary and sufficient

requirement for rapid growth and high income is not correct.<sup>13</sup> In fact, it is quite easy to use the numerical model of Section 4 to construct cases – i. e., points in  $(\sigma, \rho)$  space of *Figure 1* – such that the median voter will end up supplying zero hours of work, thereby acting just like a revenue-maximizing Leviathan.

Let us conclude by applying our theoretical considerations to an analysis of the fiscal choices of industrialized democracies over the coming decades. According to the received wisdom, the forces of tax competition and increased economic integration should in the longer run lead to a reduction in both public sector budgets and tax rates in many European countries. As tax bases become more elastic, the deadweight losses associated with existing tax systems will grow larger, and democratic governments (which, for the sake of argument we assume to be elected by median voters) will cope by cutting tax rates.

The tax competition argument assumes that future median voters are as concerned about deadweight loss as the median voters of today. However, the unprecedented process of population ageing suggests that this need not be the case. In the coming decades the older population will grow much faster than the total population in most developed democracies. According to the United Nations (2002), about 37 percent of the European population is projected to be 60 or over in 2050, an increase from 20 percent in 2000. In some countries, these changes are projected to be particularly dramatic. By 2050, more than two out of every five individuals are projected to be at least 60 years of age in Austria, the Czech Republic, Greece, Italy, Japan, Slovenia and Spain; moreover, except for the Czech Republic, more than one third of the population is projected to be aged 65 or older in 2050. As can be seen from Table 1, the projected changes are not so dramatic everywhere, but the tendencies are the same.

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<sup>13</sup> It should also be noted that cross-country evidence on the causal effect of form of government on income is mixed. Barro (1996) finds that the overall effect of democracy on growth is weakly negative, while Rigobon and Rodrik (2004) find that democracy promotes economic performance. See also Giavazzi and Tabellini (2005) and Persson and Tabellini (2005).



(Table 1 about here)

These developments, which suggest a sharp increase in the fraction of pensioners, can be expected to have significant political economy implications. Today, a majority of the population of voting age (roughly everyone above age 20) earns income in the labor market. In the coming decades, this is likely to change. Provided that labor force participation rates in different age categories remain at current levels also in the future, the rapid ageing shown in Table 1 will imply that a majority of the voting population will soon live off various kinds of social transfers (pensions, unemployment benefits, social assistance, etc).

If our analysis in this paper is correct, this development will have dramatic consequences for fiscal choices in the future. In section 3, we showed that a median voter who lives off social transfers and does not work will not care about deadweight loss, and he will prefer the tax rate that maximizes tax revenue. In effect, the median voter will mimic a rational autocrat, who seeks out the maximum point on the Laffer curve.<sup>14</sup>

Where does all this lead us? On the one hand, tax competition can be expected to exacerbate the deadweight loss of taxation; *ceteris paribus*, this tends to lower future tax rates. On the other hand, population ageing suggests that the median voter can be expected to pay less attention to tax distortions; *ceteris paribus*, this tends to increase future tax rates. In the end, whether future tax rates will be higher, lower, or approximately unchanged, seems like one of those questions that only the foolish answer with certainty.

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<sup>14</sup> Now, a change in the age distribution, leading to a larger fraction of pensioners, is not necessarily equivalent to a change in the underlying distribution of abilities such that the median voter chooses to supply zero hour of work. Technological changes may affect different age groups differently, and the endogenous results of such changes can be observed in the form of a smaller fraction of the electorate belonging to the labor force. For the age groups below the official retirement age, we can see that the inflow of women to the labor market keeps overall labor force participation rates roughly constant in the OECD. At the same time, labor force participation among men is falling OECD (2005, Table B and Table C).

### Appendix: Derivation of equations (23) and (39)

In equations (21) and (38), we showed that the following condition summarized optimal spending on the productive public good:

$$A'(g) \int_{\underline{a}}^{\bar{a}} n_i a_i dF(a) = \frac{\left\{1 - t \frac{\partial Y}{\partial g}\right\} (1-t)^{-1}}{1 + \frac{t}{Y} \frac{\partial Y}{\partial t}}. \quad (\text{A1})$$

From the definition of  $Y$  in (12), we have that:

$$\frac{\partial Y}{\partial g} = -w^* n^* \frac{\partial a^*}{\partial g} f(w^*) + \frac{A'(g)}{A(g)} \left\{ Y + \int_{a^*}^{\bar{a}} \eta^s w_i n_i dF \right\}, \quad (\text{A2})$$

$$\frac{\partial Y}{\partial t} = -w^* n^* \frac{\partial a^*}{\partial t} f(w^*) - \frac{1}{(1-t)} \int_{a^*}^{\bar{a}} \eta^s w_i n_i dF, \quad (\text{A3})$$

where  $f(w^*)$  is the density function for the wage distribution. Using (8), it follows that

$$\frac{\partial a^*}{\partial g} = \frac{A'(g)}{A(g)} \frac{1}{A(g)(1-t)} \frac{u_n(k,0)}{u_c(k,0)} < 0, \quad (\text{A4})$$

$$\frac{\partial a^*}{\partial t} = \frac{-1}{A(g)(1-t)} \frac{u_n(k,0)}{u_c(k,0)} > 0. \quad (\text{A5})$$

Substituting (A2)-(A5) into (A1), we obtain:

$$A'(g) \int_{\underline{a}}^{\bar{a}} n_i a_i dF(a) = 1,$$

which is the result shown in equations (23) and (39).

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**Table 1. Population ageing, projected trends in selected democracies**

	Share of population above age 60		
	2000	2025	2050
Austria	20.7	33.0	41.0
Czech Republic	18.4	29.5	40.1
France	20.5	28.7	32.7
Germany	23.2	33.2	38.1
Italy	24.1	34.0	42.3
Japan	23.2	35.1	42.3
Spain	21.8	31.4	44.1
Sweden	22.4	32.4	37.7
United Kingdom	20.6	29.4	34.0
United States	16.1	24.8	26.9

Source: United Nations (2002).

**Figure 1: Parameter configurations for which democracy leads to a higher (above the curve) and lower (below the curve) GDP than autocracy**

